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Examining of Turkish and portuguese education systems and science curricula

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Abstract

In recent years, Turkey and Portugal are two countries which have actively taken part in renewal process of education. The purpose of this study was to examine the Portuguese and the Turkish Education Systems and science curricula. The comparative research and documentary analysis were followed for the data. Moreover, a fourteen year process was examined with respect to the results of certain international studies in education. The differences mostly appeared at structures, while general aims and principles resembled each other. Despite the fact that the science curricula constructions are based on contemporary approaches in both countries, it's seen that science achievements remained under international average.

Keywords: Turkish Science Curriculum, Portuguese Science Curriculum, Turkish Education System, Portuguese Education System;

1. Introduction

The most significant factor for a society in protecting the culture and getting stronger is education. If education systems are considered as skeletons and curricula as the structures supporting these skeletons, it could be seen that curricula have big effects on education systems and eventually on increase of the education strength. At the present time, science education comes into prominence with the fact that it makes the daily life easy and practical. However, the problems in science education occur due to the disconnection of the modern science and the science given at schools. In addition, the improvements in science and technology, which each country adopts as criterions, are increasing with each passing day, and this necessitates the curricula renewals and system changes.

Many researchers examined and compared the education systems and curricula of countries (Karacaoglu & Cabuk, 2002; Gorard & Smith, 2004; Locke, 2008; Memduhoglu, 2008). These studies are generally called "Comparative Studies". Similar to comparing countries with each other in the world, their education systems had been used for comparison with Turkey as well. For instance; a study of comparing the education systems in Turkey and Sweden (Turkoglu, 1983), and a study of Turkish and Hungarian pre-school education (Balim, Argun & Cuez, 2006) can be exemplified for this method. Similarly this study is a general comparative research to have a look at two different countries' education systems and science curricula from a widely perspective. In this way the problem sentence of the study is "What are the similarities and diversities in Portuguese and Turkish National Education Systems and their science curricula?".

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Two of the countries, which have been experiencing an enhancement process actively in education area, are Turkey and Portugal. Both Turkey and Portugal are in relation with European Union as being member or candidates. This enhancement progress has gained speed with the outcomes of certain international studies such as TIMSS, PIRLS and PISA. This process which has been progressing after the years of 1995s is still proceeding and especially acting an efficient part in the renovation of the two countries' curricula. In this study, besides the comparison factor, the place of the two countries within approximately fourteen years process was also examined in the light of the international studies-TIMSS, PIRLS and PISA.

2. Method

To answer the research problem, the comparative research and document analysis of qualitative analyses were followed for the data. According to Turkoglu (1985) comparative study is a field of research, which examines the similarities and diversities of two or more education systems in different cultures or countries in terms of their theoretical and practical content. Moreover, a comparative research is not a field that tries to provide solutions to the education problems. On the contrary, it is a field which helps countries to move in a wide point of view by analyzing phenomena related to education while they are trying to find solutions to the education issues (King, 1979). On the other hand, document analysis is described as the analysis of documental materials that involves information about facts which are planned to study (Yildirim & Simsek, 2005). According to Simsek and Yildirim (2005) document analysis firstly starts with reaching the necessary documents. Afterwards the obtained data is examined for the analysis unit, and according to this analyzing unit, the document is interpreted. In parallel with the research method, characteristics of the two countries were examined, and general aims and structures of the national education systems and science curricula were determined as analyzing units. To gather data, the legislations and circulars related to the education systems and science curricula had been analyzed and the required literature had been examined.

3. Findings

Turkey is a country having 785.347km^2 acreage, 72.561.312 population (%24 of the population are students) and 9.305$ national annual income per capita. Country has a young population –mean age is 28,9- and is managed as republic-central management (TSI, 2009). Portugal is a country of 92.152km^2 acreage, 10.707.924 population having %19 students and 21.081$ national annual income per capita. Country has a population whose mean age is 39,4 and managed as a republic by a parliamentary system. Besides according to the human development reports (2009), Portugal has a place as the rank of 34, while Turkey's rank is 79 between 182 countries all around the world.

3.1. The Portuguese Education System:

In the 1970s Portugal underwent a series of major political, social and economic changes, with the 1974 revolution, marking the end of the dictatorship and colonial regime. In 1986 Portugal became a member of the European Economic Community (EEC) -now the European Union (EU). Following these advances, education systems were organized as well with the "Portuguese Basic Educational Law" approved in 1986 (Catela, 1998). National education policy is in the responsibility of the Ministry of Education and the Ministry of Science, Technology and Higher Education. Central Government finances public and supports private institutions. Moreover, there are independent private schools which are not financed by the government. In this case the pupils pay for their education (Eurydice, 2009). Five Regional Directorate of Education (DRE) embodies Ministry of Education in the regional level by implementing ministerial policies and providing guidelines, coordination and support to all non-higher education establishments (as cited in Lei de Bases do Sistemo Educativo, 1986).

The Portuguese Education System consists of pre-school education, primary education, secondary education and higher education. The preschool education in Portugal is designed for children aged between 3 and the age 5. This degree is optional as well as it is provided in public or private schools (Diario da Republica, 1986; "Ministerio da Educaçao", n. d.; Pessanha, Aguiar & Bairrao, 2007). Basic education corresponding compulsory education lasts nine years. The free basic education includes tuition, fees and charges related with the enrollment, attendance and certification. Besides, students may also have charge of use of textbooks and school supplies, as well as

transportation, meals and lodging when required (Diario da Republica, 1986). Basic education is organized in three consecutive cycles - 1. º for four years, 2. º for two years and 3. º for three years. Co-ordination between the cycles follows a sequence in terms of objectives, programs and teaching/learning methodologies so that each cycle is completed carrying into more detail and extending the previous cycle. The third cycle also has importance in students' life by providing the option of educational and vocational guidance for further education or participating in working life with respect for self-realization of the individuals (Diario da Republica, 1986). Secondary education is for three years. There is a variety of secondary education options available to students, who may choose between courses aimed primarily at those seeking to enter the job market (technology courses), others for those hoping to continue on to higher education (general courses), and art courses. Higher education in Portugal is organized in a dual system, including university and polytechnic education administered by public, non-public or co-operative schools. University institutions involve bachelor, master and doctor degrees, while polytechnics include only bachelor (Diario da Republica, 1986; Eurydice, 2009). Besides these levels of education, training and education of young people and adults offers a second chance to individuals who left school early or who are at risk of leaving, and those who had no opportunity to have education when young, and also to those seeking school for issues of a professional or personal value in a perspective of lifelong learning (Ministerio da Educaçao, n.d). On the other hand, distance learning has a role in the education system, especially adult and teacher training education, by providing the use of media and new technologies. Besides, abroad studying is also promoted by the State through diversified media and action under the guidance Portuguese teachers in foreign universities. In addition non-school education takes place in the education system, and it includes literacy and basic education, improvement and updating of cultural and scientific and initiation, conversion and professional development (Diario da Republica, 1986).

3.2. The Portuguese Science Curriculum:

According to TIMSS results issued in 1996, the analyses showed that science achievements of primary and middle school Portuguese students were lower than international average. Galvao and Abrates (2005) indicated that science curricula enhancement efforts gained speed as a consequence of TIMSS and PISA studies. Subsequently in 1996, the issues on basic education were held by the Ministry of Education and in conclusion a new national curriculum was developed. The new curricula adopt constructivism and are organized for the students elaborately (Abrantes, 2001). On the other hand, according to the Basic Education Law 46/86, Article 47, the national curricula takes into account the promotion of a balanced harmony in the horizontal and vertical way between levels of physical and motor, cognitive, affective, aesthetic, social and moral developments of students.

The latest science curriculum for basic education in Portugal was completed and implemented in 2002 (Galvao, Reis, Freire & Oliveira, 2007). In the light of the new national curriculum, the new science curriculum aims to provide students with the ability to raise questions about the natural world around them, arousing curiosity and increasing the appraisal, enthusiasm and interest towards science, acquire a general and broad understanding of the important ideas explanatory structures of science as well as scientific research procedures so as to feel confident when dealing with scientific and technological issues, question human behavior in the world as well as the impact of science technology on our environment and our culture in general (Galvao & Abrantes, 2005). Portuguese science curriculum for basic education consists of three levels with respect to education cycles in basic education. According to the science curricula of basic education, the distribution of scientific subjects is given in Table 2.

Table 2: Scientific Subjects in the Curriculum with respect to education levels, grades and pupils' age

Level	**Basic Education (Compulsory)**		
	1.Cycle	**2.Cycle**	**3.Cycle**
Scientific Subjects	Integrated environmental, natural and social studies, comprising the fields of biology, geography, physics, chemistry, health and environmental education and history	Integrated biology, geology, physics, chemistry, health and environmental education	Two subjects for each grade: 1)Integrated biology, geology, environmental and health education 2)Integrated physics, chemistry and environmental education

Source: "Science Provision in Portugal" in "Science Curriculum in Portugal: From The Development to The Evaluation of Students' Competences" by Galvao, C. ,Reis, P., Freire, A.and Oliveira, T. (2007).

The course names are alternately Estudo do Meio-Environmental Studies for the first cycle, Ciencias da Natureza-Natural Sciences for the second cycle and Ciencias Fisicas e Naturais-Physical and Natural Sciences for

the last cycle in basic education. The scientific disciplines are organized into four learning areas called Earth in Space, Earth in Transformation, Sustainability of Earth and Better Living on Earth. The first theme focuses on the location of the planet Earth in the universe and their interrelation with this larger system, the movement of the Earth and its influence on life. The second theme is intended to the constituents of the Earth and phenomena that occur in it, while the third theme is about becoming aware of importance of acting at the level of the Earth system so as not to lead to imbalances, contributing for an orderly management of existing resources. The Better living on Earth theme aims at the realization that the quality of life means health and safety in an individual and collective perspective. Areas such as biotechnology which are relevant to the scientific society and technology are essential knowledge for the quality of life. These learning areas are placed from the basic to the complex concepts in each cycle. Science concepts of the first cycle are integrated with concepts of Geography and History within the framework of "environment". Briefly, health education to protect their health and to discover their bodies, environment education to recognize the plants and animals and basic concepts to increase the conscious of their social responsibilities form the conceptual framework of science curriculum. Five hours in a week, of which half should be dedicated to experimental teaching of science are allocated for this environmental studies. In the second cycle, curriculum includes certain concepts of biology, geology, chemistry, and physics, integrated in a subject entitled "Sciences of the Nature". In the third cycle, science education is divided into two parts. In one part, biology, geology, environment and health education, in the other part physics, chemistry and environment education take place (Galvao & Abrantes, 2005; "Ministerio da Educaçao", n.d.a). One of the most important characteristics in Portuguese science curricula is having multi-disciplinary structure. A course lasts for 90 minutes period. While the hours in a week of the first cycle aren't explicitly indicated that it only shows the total hours of all courses in the cycle, the second cycle course-Natural Sciences- has 3,5 course hours with the integration of mathematics. In the third cycle Physical and Natural Sciences has 2 course hours in each year. The hours in a week of the last year increases to 2,5 (Decreto-Lei no. 209/2002-Diario da Republica, 2002). Besides, when Portuguese science curriculum's looked over within the curriculum components, it's seen that assessment process of the students is not obvious. Assessment processes are of importance that deficiency of this component can cause to guiding problems.

1.3. The Turkish Education System:

With the Basic Law of National Education approved in 1973, Turkish National Education System is constructed and regulated in integrity. The Turkish National Education System consists of two main sections as formal education and non-formal education. The formal education includes pre-school education, primary education, secondary education and higher education institutions. The non-formal education encloses all of the educational activities organized besides or out of formal education (MEB, n.d.a). Administrative legislation and supervision related to formal and non-formal education except for higher education is performed by Ministry of Education-MEB. MEB is responsible for preparing curriculum, maintaining coordination between educational institutions, construction of school buildings etc. Supervision of educational institutions is carried out at both local and provincial level. Higher education institutions are autonomous for purposes of education and research. However, they have to submit annual reports to (YÖK) Higher Education Council which is responsible for the planning and coordination of higher education (Eurydice, 2010).

Pre-primary education is optional covering the children between 3 and 5 ages. However, a pilot project has started at 32 provinces at 2009/10 education year to take all 5 years-old children obligatory to pre-school education. Main pre-primary education providers are MEB, some public institutions and private education institutions. The duration of basic (compulsory) education delivered in single structured primary school is eight years for the children between ages of 6 and 14 (MEB, n.d.b). Primary education is free of charge in public institutions. Parents are free to choose any private school for their children provided that they pay the fee. Secondary education is provided in general, vocational and technical education and art institutions giving four years of education for students who have completed primary education. Higher education institutions consist of universities, higher technology institutes and vocational colleges. On the completion of short-cycle vocational colleges (2 years), a vocational qualification known as associate degree diploma is awarded by two-year vocational colleges in general affiliated to the universities. University degrees include first-cycle qualification, BA degree, and second-cycle qualification known as MA degree. A PhD/doctoral degree requires a further four years of study (Eurydice, 2010).

1.4. The Turkish Science Curriculum:

Turkey, after the Republic was founded, took great strides in curriculum improvement practices for the Turkish Education System not to stay behind the developments in the world. In this period, both the critics of researchers from abroad had benefited from and curricula of different countries had been analyzed. Among these countries, Ireland, England, Canada, Singapore and Australia had been analyzed (Bahar, 2006). The new science curriculum in Turkey was arranged and put into practice in 2005 with the recent developments in science education. The course name which was called 'Science Knowledge' before 2005 was changed to 'Science and Technology'.

In science curriculum the goals are determined as helping students in learning and understanding the world, encouraging the sense of curiosity of all of the student in each level to the nature with the scientific and technologic developments, helping the students in understanding the nature of Science and Technology and the interaction between science, technology, society and environment, helping the students in gaining skills of constructing knowledge by means of investigating, reading and argument, constructing the framework of knowledge, experience and interest in choosing professions about science and technology, helping students in learning to learn, helping them in problem solving using science and technology, teaching how to decide in consciously and use of scientific process skills and helping them to have scientific values such as inquiring and reasoning (MEB, 2005). In the course of science and technology there are seven learning areas four of which are about scientific concepts and the rest is to develop scientific literacy of students. The learning areas are "Living Beings and Life", "Matter and Transformation", "Physical Events" and "Earth and the Universe" for the conceptual part and "Science, Technology, Society and Environment", "Scientific Process Skills" and "Attitudes and Values" for the scientific literacy development. The last three learning areas are associated with the conceptual learning areas during the academic year because of being acquisitions which needs long processes to have. The conceptual knowledge is constructed in the learning areas based on a convoluted structure. A knowledge of a learning area in a grade helps to construct a new knowledge in the next grade (Bağ & Uşak, 2005). Science is integrated in a course called "Life Knowledge" in the first three years which means that the curriculum involves only the Science and Technology courses from the fourth grade to the eighth. Owing to a curriculum in a convoluted structure, the science subjects such as physics, chemistry, biology, geology, environment and health education are shared commensurately in each grade.

1.5. The Progress of Education in Turkey and Portugal According to Certain International Studies:

When the organizations are examined with respect to the participation rates of Turkey and Portugal, it is apparent that two countries' participations are not regular except several of them. Among these studies TIMSS and PISA have the most participation degrees. Portugal hasn't taken any part in any of the studies organized by TIMSS except 1995 study. The results showed that Portugal was much under the international average in science and mathematics achievements. Within this study, researchers had examined schools, curricula, instruction, lessons, textbooks, policy issues, and the lives of teachers and students to understand the educational context in which mathematics and science learning take place. Thus, these results prompted the government to a renewal process and on the way of increasing the education level of the country among the international platform, which causes an arrangement in the curricula again in 1996. Besides, when TIMSS studies are examined in terms of Turkey's participation, it is seen that this country begins to participate in such studies in 1999. In addition to this participation, after a long time of not participating, Turkey again takes place in the 2007 study. In 1999 study, the results show that Turkey's mathematics and science achievements are also much under the international average. Similar to Portuguese curricula renewal process, a process regarding the curricula started in Turkey as well. When 2007 study is analyzed, the achievements in science and mathematics are still under the international average but by comparison with the study Turkey took part in 1999 the results are closer to the international average. Therefore, if we compare the studies which Turkey participated in 1999 and 2007, it is apparent that an increase in mathematics and science education has taken place in Turkey. This indicates the renewal process in education components and especially the curricula have influences on the country's place in the international platform.

PISA studies give more information about the countries' processes in the international platform because of regular participation of both countries. These studies assess some of the knowledge and skills such as mathematical literacy, reading literacy and scientific literacy that are essential for full participation in society. Comparing the results in 2000, 2003 and 2006, Portugal draws a line under the international average. However, the mean points of mathematics, science and reading literacy are on a considerable rise among the countries in each study. Especially it

is seen that science literacy in Portugal has gained the most rise. In Turkey's part of the studies, only the reading literacy has a considerable increase among the fields within the years that Turkey participated. Mathematics and science literacy are virtually in the same level in each study. In conclusion it is clear that Portugal has made progress better than Turkey especially in science education. PIRLS studies are the reading assessments carried out every five years. The participation is very rare that Turkey only participated in the 2000 study while Portugal never took part in. The only study Turkey took part in shows that this country is under the international average with respect to the reading literacy.

4. Conclusions

Consequently, the following results have been obtained by means of the findings within the study:

• In terms of two countries' national education systems, as there are similarities, there also are basic differences. The differences occur at the structural framework of the education systems. The basic education which is divided into three cycles in Portugal is a complete system and has no cycles in Turkey. Besides, different from 9 year of compulsory education including pre-school education in Turkey, Portuguese compulsory education lasting 9 years doesn't involve pre-school education. In the light of certain studies related to the necessity of pre-school education, Turkey has constructed the pre-school level into the compulsory education over the last years.

• The diversities and similarities also show themselves as far as science curricula are concerned. Similarities occur in the basic aims of the science curricula. Moreover, each country adopts constructivism as the theoretical frame. The differences begin in the conceptual context within the educational grades. In Turkish science curricula the concepts follow a convoluted way which means each concept is constructed on the previous one. A unit called "Force and Motion" in the curriculum can be examined to exemplify this situation. While in the first years of basic education only the concepts and descriptions such as force, motion and sorts of force etc. are presented to the students, in the passing years the concepts gain details therefore more particular context about force and motion is given. In the same way, Portuguese curriculum also has this convoluted structure as well. In parallel with the convoluted structure, every educational grade includes divided scientific units from all of the scientific areas such as chemistry, physics, biology and etc. in the Turkish curriculum. However, this frame changes in the Portuguese science curriculum. The subjects are presented to the students in an integrated way. This integrated frame cannot still be applied systematically in Turkey.

• Despite the fact that the science curricula constructions are based on contemporary approaches in Turkey and Portugal, differently from the other developing countries -in terms of education- science achievements of the students stay under the international average. This situation can be related to the curricula implementations process in both countries. Therefore, in the implementation process the role of the teachers and learning environments cannot be overlooked. The countries should focus their attention on the implementation process and especially teacher trainings.

Finally, such comparative and document analysis studies related to the education systems and science curricula should be increased by researchers to enhance the development of education systems and national science curricula to reach the contemporary education conditions. By examining such studies and evaluating the progress in other countries, it will be possible to advance the system and curriculum enhancement.

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